PROPOSED PLAN
Outboard Marine Company/Waukegan Coke Plant
Waukegan, Illinois

PUBLIC COMMENT PERIOD

U.S. Environmental Protection Agency (U.S. EPA) will accept written comments on the Outboard Marine Company/Waukegan Coke Plant Proposed Plan during a public comment period.

Date: February 22, 1999 to March 23, 1999.

PUBLIC MEETING

U.S. EPA will hold a public meeting to explain the Proposed Plan on the Outboard Marine Company/Waukegan Coke Plant (WCP Site or Site). Oral and written comments will also be accepted at the meeting.

Date:	Wednesday, March 3, 1999.
Time:	7:00 - 9:00 p.m.
Place:	Waukegan Public Library 128 North Country Waukegan, Illinois

PROPOSED PLAN
OUTBOARD MARINE COMPANY/WAUKEGAN COKE PLANT SUPERFUND SITE

WAUKEGAN, ILLINOIS
February 1999

INTRODUCTION

This Proposed Plan was prepared for the WCP Site located at approximately 100 Sea Horse Drive, Waukegan, Illinois (approximately 35 miles north of Chicago, Illinois). The purposes of this Proposed Plan are to present U.S. EPA's recommended cleanup remedy for the Site[1], describe the other remedial options considered, solicit public review and comment on all of the alternatives described, and provide information on how the public can be involved in the remedy

[1] Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requires publication of a notice and Proposed Plan for Site remediation. The Proposed Plan must also be made available to the public for comment. This Proposed Plan is a summary of information contained in previous investigation and design documents for the WCP Site. Please consult the Administrative Record for more detailed information.

selection process. This Proposed Plan is a summary document and the Remedial Investigation (RI), Feasibility Study (FS) and previous investigations and design reports, as well as any other pertinent documents in the Administrative Record and Information Repositories, should be consulted for in-depth details on the development and evaluation of the alternatives considered. The objectives of previous investigations and design reports have been to determine the extent of contamination at the Site, to evaluate alternatives to address threats or potential threats posed by the Site, and to identify, develop, and evaluate cleanup alternatives appropriate for the Site.

Public input on the alternatives and the information that support these alternatives is an important contribution to the remedy selection process. Based on new information or public comment, U.S. EPA may modify the recommended alternative or select another alternative. The public is encouraged to review and comment on all technologies and alternatives considered for the Site.

SITE BACKGROUND

The 36-acre Waukegan Manufactured Gas and Coke Plant Site is located in Waukegan, Illinois, on a peninsula separating Waukegan Harbor (the harbor) on the west from Lake Michigan (the lake) on the east (see Figure 1). The EJ&E Railroad purchased the Site in 1893 and the western portion of the Site was developed commercially as a creosote wood-treating plant in 1908. The Site began use as a larger manufactured gas and coke plant in circa 1928 and operated under various owners through 1969. The creosote plant was dismantled sometime after 1917 and the remaining coke plant structures were demolished in 1972. Between 1973 and 1989 Outboard Marine Company (OMC) used the property for various operations and activities including fire training, public parking, and snowmobile testing. Larsen Marine currently uses the northwestern portion of the Site for seasonal boat and trailer storage. The property and its surrounding properties have historically been used as part of the industrial/commercial waterfront in Waukegan. The sand dunes/beach area adjacent to the WCP Site on the lake side is used for public recreation.

The soil at the WCP Site and both on and off-site ground water quality has been adversely impacted by contaminants from past wood treating and gas manufacturing activities. Soil at the WCP Site is contaminated with coal tar and arsenic from past gas manufacturing processes and creosote from past wood treating processes. The coal tar and sludges from past gas manufacturing processes are composed of hundreds of different compounds including Polynuclear Aromatic Hydrocarbons (PAHs), phenols, and volatile aromatics. The coal tar contamination occurs in discrete deposits in the eastern and southern part of the Site. The creosote contaminated soils is a result of the previous wood treating operations. This contamination was discovered during construction of Slip Number 4 during the OMC polychlorinated biphenyls (PCB) cleanup. A temporary storage pile of the creosote contaminated soils from the wood treating operations is located onsite immediately south of Slip Number 4 (where the contaminated soils/sediments were removed). Creosote is produced from a blend of the fractional distillates of coal tar. This blend may be diluted with coal tar or petroleum oil. Creosote typically contains less distillation residue and is generally less viscous

than coke oven coal tar. The arsenic soil contamination is a result of manufactured gas processes and is most prevalent at one location in the eastern part of the Site; lesser concentrations of arsenic occur along much of the eastern half of the Site (see Figure 2).

Ground water contamination occurs in the sand aquifer to depths of approximately 30 feet below the ground surface. The impacted ground water has elevated concentrations of several contaminants from the gas manufacturing processes. The major contaminants of concern are arsenic, phenol, thiocyanate and ammonia. The highest concentrations of these contaminants are located in the lower 5 feet of the aquifer. There is a ground water divide on-site that results in contaminated ground water being discharged to surface water into both the Waukegan Harbor to the west and Lake Michigan to the east. The discharges to Lake Michigan have resulted in exceedences of the current State of Illinois Surface Water Quality Standards for open waters of the lake for ammonia.

A series of presentations have been made to the Waukegan Citizens Advisory Group (CAG) over the past several years in an attempt to solicit early input on remedies under consideration. However, this Proposed Plan process represents the first formal input opportunity for the community and other interested parties.

SCOPE AND ROLE

The overall Site cleanup strategy uses a combination of on-site treatment of ground water, off-site treatment and disposal of PAH and creosote soils and on-site solidification/stabilization of arsenic contaminated soils. The PAH and arsenic contaminated soils are considered the principle threats at this Site. Low-level threats will be managed by long-term on-site containment of soils and Monitored Natural Attenuation of ground water. The proposed remedy fully addresses soil and ground water contamination at this Site. The Site is identified as Operable Unit 2 of the larger OMC National Priorities List Site. The proposed remedy represents the final Site-wide remedy and builds upon the previously completed PCB cleanup conducted by the Outboard Marine Company. The OMC PCB cleanup is fully complete and operating under long-term Operation and Maintenance requirements. Although the PCB cleanup is complete, there are residual PCB concentrations on-site. The residual PCB cleanup concentrations are below the required cleanup levels determined in the OMC Record of Decision. Therefore, discussions of the residual PCB concentrations appear in the risk calculations for the Waukegan Coke Plant but are considered covered under the cleanup requirements of the OMC ROD.

SUMMARY OF SITE RISKS

Ground water sampling beneath and several hundred feet down gradient of the Site indicates that contaminant concentrations exceed drinking water standards set by U.S. EPA under the authority of the Federal Safe Drinking Water Act (called Maximum Contaminant Levels or "MCLs") and the State of Illinois Drinking Water Standards. Further, contaminated ground water from the Site is also directly discharging to surface water in Waukegan Harbor and Lake Michigan. These

ground water to surface water discharges have contributed to exceedences of the State of Illinois Surface Water Quality Standards for open lakes in Lake Michigan.

Because of the documented presence of soil and ground water contamination, an analysis was conducted to estimate the health or environmental problems that would result if the soil, ground water, and ground water's impact to surface water were not addressed. This analysis, commonly referred to as the Baseline Risk Assessment, evaluates current and future potential human health or environmental risks associated with the Site at the time of the remedial investigation.

One important consideration in the Baseline Risk Assessment is present and future land use. Land use is important because it assists in defining durations of exposures to contaminants. As stated previously, the Site is located in an industrial/commercial corridor and the majority of the Site is fenced or is directly adjacent to the harbor. For purposes of completeness, the following risk discussion includes a residential land use scenario. The inclusion of the residential scenario is for comparison purposes and is not considered an appropriate present or future Site use.

The majority of the Site has been vacant since the demolition of the buildings in the 70's, with the exception of the northwest and southeast quadrant of the Site. The northwest quadrant is currently being used by Larson Marine for seasonal boat and boat trailer storage, the southeast quadrant of the Site is currently occupied by OMC's data building, administration building, parking lots, and lawn. There are no known present uses of ground water within the Site boundaries. There is limited access to the surface water in Waukegan Harbor, and it is expected that exposure to contaminated surface water in the harbor adjacent to the Site would be limited to trespassers. Fish ingestion from contaminated surface water in both Lake Michigan and Waukegan Harbor is also a possible exposure pathway.

Exposure to soil was evaluated in the boat storage area, the OMC office building area, and the area of elevated contamination because of the potential for the future and existing uses for these areas to differ from the rest of the Site.

The Reasonable Maximum Exposure (RME) individual and the less conservative Central Tendency Exposure (CTE) were developed in the risk assessment and are summarized in the following table. The Feasibility Study (FS) developed preliminary remedial goals (PRGs) based on exposure assumptions. Target Soil Concentrations (TSC), were also developed based on less conservative assumptions than those used in the Baseline Risk Assessment. The TSCs are used to target soils for active remediation rather than containment approaches.

The risk characterization process integrates conservative exposure assumptions and toxicity assessments for the Contaminants of Concern (COCs) into a measurable expression of risk for each exposure scenario. The cancer risk is expressed as a probability of a person developing cancer over the course of his or her lifetime based on residential or industrial land use exposure. Cancer risks from various exposure pathways are assumed to be additive. Excess lifetime cancer risks less than $1x10^{-6}$ (one-in-one million) are considered acceptable by U.S. EPA. Excess

lifetime cancer risks between $1x10^{-4}$ (one-in-ten thousand) to $1x10^{-6}$ require U.S. EPA and Illinois EPA (the Agencies) to decide if remediation is necessary to reduce risks and to what levels cleanup will occur. Excess lifetime cancer risks greater that $1x10^{-4}$ generally require remediation.

For noncarcinogens, potential risks are expressed as a hazard index. A hazard index represents the sum of all ratios of the level of exposure of the contaminants found at the Site to that of contaminants' various reference doses. In general, hazard indices which are less than one are not likely to be associated with any health risks. A hazard index greater than one indicates that there may be a concern for potential health effects resulting from exposure to noncarcinogens.

The estimated risks for the exposure pathways evaluated are presented below. The contaminants most often contributing to the risk are PAHs and arsenic.

Exposed Population	**RME Cancer Risk**	**CTE Cancer Risk**	**RME Noncancer Risk HI**	**CTE Noncancer Risk HI**
Boatworkers exposed to surface soil	5×10^{-5}	2×10^{-5}	< 0.1	<0.1
Adolescent trespassers exposed to surface soil	7×10^{-5}	2×10^{-5}	< 0.1	< 0.1
Utility workers exposed to subsurface soils in the OMC office building area	4×10^{-8}	4×10^{-9}	< 0.1	< 0.1
Residential children exposed to subsurface soils	2×10^{-3}	6×10^{-4}	3.7	0.97
Adolescent trespassers exposed to subsurface soils	3×10^{-5}	6×10^{-6}	< 0.1	< 0.1
Residential children exposed to subsurface soils in area of elevated contamination	3×10^{-2}	7×10^{-3}	63	14
Utility workers exposed to subsurface soils in area of elevated contamination	8×10^{-6}	1×10^{-6}	2.0	0.4
Future residential children and adults ingesting groundwater[1]			Lethal acute risk due to arsenic	Lethal acute risk due to arsenic
Utility workers exposed to groundwater	6×10^{-6}	5×10^{-7}	0.21	<0.1
Recreational swimmers exposed to Lake Michigan surface water	$< 1 \times 10^{-7}$	Not calculated	<0.1	Not calculated

Adult subsistence fishermen ingesting fish from Lake Michigan [2]	3×10^{-6}	2×10^{-8}	<0.1	<0.1
Adolescent recreational fishermen ingesting fish from Lake Michigan[2]	2×10^{-8}	4×10^{-10}	<0.1	<0.1
Current adult subsistence fishermen ingesting fish from Waukegan Harbor[2]	9×10^{-6}	5×10^{-7}	2.2	0.44
Current child subsistence fishermen ingesting fish from Waukegan Harbor[2]	3×10^{-6}	7×10^{-7}	4.1	0.83
Future adult subsistence fishermen ingesting fish from Waukegan Harbor[2]	2×10^{-5}	6×10^{-7}	0.74	0.31
Future child subsistence fishermen ingesting fish from Waukegan Harbor[2]	8×10^{-6}	8×10^{-7}	1.4	0.58

Notes:

1. Due to the acute toxicity of the exposure point concentrations, a quantitative risk is not presented.
2. Arsenic is the primary contributor to carcinogenic risk from fish ingestion. Calculated risk is likely an overestimate because the amount if additional arsenic intake from fish is a small percent of normal daily arsenic intake. Also estimated future surface water concentrations may be overestimated because of attenuation due to adsorption onto aquifer solids and greater dilution than that assumed.

An ecological assessment was conducted to evaluate the effects of Site contaminants on terrestrial and aquatic environments within or near the Site. Several Site contaminants (phenols, PAHs and metals) were identified that may potentially pose a risk. However, observable chemical effects on terrestrial and aquatic organisms were not evident, but onsite studies were limited to qualitative observations only.

REMEDIATION OBJECTIVES

Remedial Action Objectives (RAOs) have been developed for all the contaminated soils (the PAH, creosote and arsenic contaminated soils), ground water and surface water. RAOs provide a basis for evaluating potential remedial action alternatives.

Soils -

- Protect human health by reducing or eliminating exposure (direct contact, ingestion, inhalation) to soil with concentrations of contaminants representing an excess cancer risk of greater than $1x10^{-6}$ as a point of departure and a hazard index (HI) greater than 1 for reasonably anticipated future land use scenarios.

- Protect the environment by minimizing/eliminating the migration of contaminants in the soil to ground water or to surrounding surface water bodies.

- Ensure future beneficial commercial/industrial use of the Site.

Ground Water -

- Protect human health by eliminating exposure (direct contact, ingestion, inhalation) to ground water with concentrations of contaminants in excess of regulatory or risk-based standards.

- Protect the environment by controlling the off-site migration of contaminants in the ground water to surrounding surface water bodies which would result in exceedence of Applicable or Relevant and Appropriate Requirements (ARARs) for Contaminants of Concern (COCs) in surrounding surface waters.

- Reducing contaminant levels in shallow ground water to meet MCLs and State of Illinois Drinking Water Standards.

Surface Water -

- Protect human health by minimizing exposure (direct contact, ingestion, inhalation) to surface water that has been impacted by Site-related ground water with concentrations of contaminants such that regulatory or risk-based surface water standards have been exceeded.

- Protect the environment by controlling the off-site migration of contaminants in the ground water to surrounding surface water bodies which would result in exceedence of ARARs for COCs in surrounding surface waters.

- Reducing Site-related contaminant levels in the surface water to meet the State of Illinois Surface Water Quality Standards.

SUMMARY OF ALTERNATIVES

The remedy evaluation process conducted by U.S. EPA, in consultation with the Illinois EPA, compared a number of different remedial alternatives and a no action alternative. Upon a thorough screening of a wide spectrum of in-situ and ex-situ remedial alternatives, four combined alternatives were selected for detailed analyses and subjected to evaluation under the National Contingency Plan (NCP) criteria. Although the alternatives are identified as 1 through 4, there were a number of different options within alternatives 2 and 3 (i.e., RCRA landfill disposal versus off-site co-burning soil options). The more conservative costs are presented below (2A and 3A) because specific studies will be required to verify disposal options.

The alternatives are:

- **Remedial Alternative 1:**

  No action is the absence of any remedial action. No action is considered in this evaluation as a baseline for comparison to all other potential remedial action as required by the National Contingency Plan. This alternative would have no associated costs.

- **Remedial Alternative 2:**

  Vadose Zone Soil Remedial Components

  - Excavation of PAH Remediation Zone soil and treatment by power plant co-burning or equivalent process.
  - On-site stabilization/solidification of the Arsenic Remediation Zone soil.
  - Asphalt cap for the Marginal Zone soil area.
  - Land development restrictions to protect the integrity of the cap, the ground water slurry wall, and the associated storm-water detention basin.

Variations of this alternative are Alternative 2B, which includes disposal of PAH and Arsenic Remediation Zone soils at a RCRA Subtitle C or D landfill, and Alternative 2C, which includes construction of an on-site containment unit for PAH and Arsenic Remediation Zone soils.

Ground Water Remedial Components

- Containment system on the eastern portion of the Site, consisting of a slurry wall system and interior extraction/drainage units.
- Treatment cells on the beach and harbor with reinjection in cells. Ex-situ treatment includes the removal of arsenic, phenols, organics and ammonia.
- Monitored Natural Attenuation.
- Infiltration reduction in areas capped with asphalt cap and the lined storm-water detention basin.
- Institutional controls to prevent the installation of potable wells.

The estimated costs for Alternative 2 are:

Estimated Capital Cost	$21,100,000
Present Worth of O&M	$17,800,000
Total Present Worth	**$38,900,000**

- **Remedial Alternative 3**

Vadose Zone Soil Remedial Components

- Excavation of the PAH Remediation Zone soil and off-site treatment by power plant co-burning or equivalent process.
- On-site stabilization/solidification of the Arsenic Remediation Zone soil.
- Vegetative cover for the Marginal Soil Zone, the backfilled excavation areas and the Southwest quadrant of the Site.
- Development of institutional controls and a post-remedy soil management plan.

A variation of this alternative is Alternative 3B, which includes disposal of PAH and Arsenic Remediation Zone soils at a RCRA Subtitle C or D landfill.

Ground Water Remedial Components

- Multiple treatment cells on the beach and on-site near the harbor ground water/surface water interface with reinjection. On-site treatment of ground water includes the reduction of arsenic through precipitation, and the reduction of phenols, organics and ammonia through a biological system.
- Monitored Natural Attenuation for ground water outside the remediation zone and inside the remediation zone after the treatment cells are completed.
- Infiltration reduction and direct contact exposure minimization through a combination of vegetative, asphalt, and buildings as covers.
- Institutional controls to prevent the installation of potable wells.

The estimated costs for Alternative 3 are:

Estimated Capital Cost	$14,100,000
Present Worth of O&M	$10,900,000
Total Present Worth	**$25,000,000**

The most significant differences between Alternative 2 and 3 are that Alterantive 2 includes the construction of a slurry wall for ground water, the extraction and treatment of ground water from behind the slurry wall, the construction of a detention basin and the installation of an asphalt cap. Alternative 3 does not include a slurry wall or detention basin and has a combination vegetative, building and asphalt cap over a larger portion of the Site.

- **Remedial Alternative 4**

  Vadose Zone Soil Remedial Components

  - Excavation of PAH Remediation Zone soil and treatment by power plant co-burning or equivalent process.
  - Stabilization/solidification of Arsenic Remediation Zone soil.
  - Disposal at a RCRA Subtitle D landfill for Marginal Zone soil.

  Ground Water Remedial Components

  - Ground water extraction at 200 gpm from wells located along the hydraulic divide. Ex-situ treatment includes the removal of arsenic, phenols, organics, and ammonia prior to discharge to the North Shore Sanitary District. The ground water remediation goal is restoration of the aquifer to drinking water standards.

The estimated costs for Alternative 4 are:

Estimated Capital Cost	$44,200,000
Present Worth of O&M	$56,500,000
Total Present Worth	**$101,000,000**

The most significant differences between Alternative 3 and 4 are that Alternative 4 includes off-site disposal of the Marginal Zone soils and includes site-wide long-term treatment and off-site discharge of ground water.

EVALUATION OF ALTERNATIVES

EPA makes remedy decisions under remedial authority by identifying a number of alternatives and evaluating these alternatives against the following criteria.

1. **Overall protection of human health and the environment** - determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.

2. **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)** - evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirements that pertain to the Site, or whether a waiver is justified. The Preferred Alternative will require a waiver of the Underground Injection Control prohibition of reinjection of liquids in exceedence of MCLs. A more thorough discussion is contained in the Preferred Alternative Section.

3. **Long-term effectiveness and permanence** - considers the ability of an alternative to maintain protection of human health and the environment over time, and the reliability of such protection.

4. **Reduction of contaminant toxicity, mobility, or volume through treatment** - evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.

5. **Short-term effectiveness** - considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.

6. **Implementability** - considers the technical and administrative feasibility of implementing the alternative, such as relative availability of goods and services.

7. **Cost** - includes estimated capital and operation and maintenance costs, as well as present worth costs. Present worth cost is the total cost of an alternative over time in terms of today's dollar value.

8. **State acceptance** - considers whether the State agrees with U.S. EPA's analyses and recommendations of the RI, the FS and the Proposed Plan.

9. **Community acceptance** - will be addressed in the Record of Decision (ROD), which will include a responsiveness summary that presents public comments and U.S. EPA responses to those comments. Acceptance of the recommended alternative will be evaluated after the public comment period.

Based on the evaluation of the NCP criteria, remedial Alternative 3 has been identified as the preferred alternative. It is protective of public health and the environment, it complies with ARARs and provides the best balance of tradeoffs among the other alternatives with respect to the remaining criteria.

The No Action alternative was eliminated from consideration because it is not considered protective of public health and the environment. The remaining alternatives are all considered protective and all would meet ARARs.

All alternatives are readily implementable. Long-term effectiveness and permanence is best met by Alternative 3 because of the inclusion of the combination vegetative cover. This cover reduces soil contaminant concentrations, reduces the rate of contaminant migration to surface water by reducing infiltration, and the ground water remediation system will further enhance in-situ biodegradation of contaminants in ground water. Alternative 3 also offers significant reductions in toxicity, mobility and volume of soil and ground water contaminants through treatment. Alternative 3 offers continuous reductions in contaminants through treatment with the vegetative cover. Alternative 4 also offers significant reductions in contaminants although it may be technically impracticable to achieve the low contaminant remedial goals in ground water. The short-term effectiveness of the alternatives is another critical criteria in this evaluation and is best measured by the relative impacts on the community, workers and the environment during remediation. Because Alternative 4 involves excavation of a much larger volume of contaminated soil (100,000 vs. 10,000 cubic yards), it has the greatest potential for adverse impacts during construction. Short-term impacts from Alternatives 2 and 3 are much more readily prevented.

Capital costs of the alternatives range from $14,000,000 for Alternative 3 to $44,000,000 for Alternative 4. Present worth costs, which include the present value of annual operation and maintenance costs, range from $25,000,000 for Alternative 3 to $101,000,000 for Alternative 4. Because of its much higher costs Alternative 4 is not considered cost effective.

PREFERRED ALTERNATIVE

U.S. EPA has completed a critical review of all of the potential pathways, remedial action objectives and future uses. Based on this critical review, the U.S. EPA has identified a proposed remedy that is a slight modification of Alternative 3[2], specifically the proposed remedy includes:

Vadose Zone Soil Remedial Components

- Excavation of the PAH Remediation Zone and the temporary storage pile of creosote contaminated soil and either off-site: 1) treatment by power plant co-burning[3], 2) disposal at a RCRA Subtitle C or D landfill, or 3) an equally protective off-site option. The PAH Remediation Zones represent the area where the concentrations of PAHs pose an unacceptable carcinogenic risk using the future commercial/industrial, utility worker, and construction worker exposure scenarios. The PAH Remediation Zones represent an estimated in-place soil volume of between 7,100 and 14,900 cubic yards (cys). The temporary creosote

[2] The off-site treatment/disposal of the creosote contaminated soils in the temporary storage pile was not included in the Feasibility Study Alternative 3 but will be a requirement of the Record of Decision.

[3] Treatment is the preferred alternative for both the PAH and arsenic contaminated soils. Placement of the PAH soils in a landfill will only be selected if it is determined during the Remedial Design that treatment is not practicable (e.g., not feasible, excessive cost, etc.).

contaminated soil pile is currently covered and routinely inspected. This volume is estimated to be approximately 4,500 cys and will be removed in its entirety. The exact amount of soil requiring off-site treatment/disposal will be based on actual field data.

- On-site stabilization/solidification of the Arsenic Remediation Zone soil. The extent of the solidification will be protective to a 10^{-5} cancer risk for future commercial/industrial, utility worker, and construction worker exposure scenarios and protective of ground water. The total area of Arsenic Remediation Zone is estimated to be between 3,300 and 7,200 cys. The exact amount of soil requiring onsite solidification will be based on actual field data.

- Combination vegetative, asphalt and building cover for Marginal Zone soil, the backfilled excavation areas and the Southwest quadrant of the site. This cap will minimize infiltration, manage surface water drainage/erosion control, enhance in-situ degradation of low-level residual soil organic contaminants and provide a barrier from exposure. The Marginal Zones are situated both around and over the PAH and arsenic remediation zones. The vegetative cover will result in an industrial Site-wide cancer risk of 10^{-6} or less.

- Development of institutional controls. Deed restrictions will be placed on the Site limiting its use to industrial/commercial and uses that will not fundamentally impact the remedy. Ground water use will be prohibited until such time that ground water meets the Federal and State drinking water standards.

- Development of a comprehensive Soil Management Plan. The purpose of this document is to clearly delineate the testing requirements and the process and procedures for approving future uses/development of the Site.

Ground Water Remedial Components

- Interim Ground Water Removal - Ground water will be removed and treated in an on-site treatment/reinfiltration system (see Figure 3). The interim ground water remedy is aimed at contaminant mass removal in the short-term that will provide long-term protection of nearby surface water bodies. Ground water will be removed and treated through a cell-based, low-flow extraction system. The cells will be sequentially operated (see Figure 4). The areal extent of the plume to be treated by the cells and the cell design will be based on current data, a pre-design investigation and a pilot treatment system.

- Interim Ground Water Treatment - The extracted water will be treated on-site for arsenic, organics, phenols, and ammonia and will be reinjected through wells along the perimeter of cells. The performance goal for the treatment cell area is

an 80% reduction in contaminant mass at the base of the aquifer (the performance standard will be developed during the pilot study). In the event the conditions in the field grossly retard treatment, a critical evaluation of cell treatment will occur after the completion of four pore volumes on any individual cell. This ground water cell treatment/reinfiltration process is expected to take six to twelve months per cell and will be expedited by simultaneous operation of four treatment cells.

- Waiver of the UIC Prohibition - The Preferred Alternative will require a waiver of the UIC prohibition of reinjection of liquids into the formation from which they were removed at concentrations exceeding MCLs. The Preferred Alternative requires reinjection to increase the removal rate of contamination, to enhance the ground water nutrient chemistry to add nitrate and to oxygenate the ground water. This nitrate addition and oxygenation will stimulate microbial degradation of residual contamination in the aquifer. The U.S. EPA and/or Illinois EPA will invoke the interim action ARAR waiver of the NCP for the approximately six years the interim ground water system operates.

- Long-term Monitored Natural Attenuation - A laboratory study on the intrinsic bioremediation capabilities of ground water at the Site was completed in 1998. This study concluded that an approximately 33% decrease in contaminant concentrations provides conditions conducive to natural attenuation. Once the interim ground water treatment component is completed, the Monitored Natural Attenuation ground water remedy will meet the very long-term objective of meeting ground water standards by allowing natural processes to remediate the contaminants. Long-term ground water monitoring will be directly compared to the projections developed in a Monitored Natural Attenuation Study. This study includes sampling to; 1) document ongoing reductions in contaminant concentrations, 2) show the presence of contaminant daughter products 3) show the presence of terminal electron donors/acceptors , 4) determine the amount of dilution occurring within the plume with conservative tracers, and 5) allow multi-dimensional plume modeling. Projections of the natural attenuation of the plume made during the Natural Attenuation Study will be critically evaluated over time in comparison to actual long-term ground water sampling data. The entire ground water plume area will be managed as a Groundwater Management Zone pursuant to the requirements of Illinois Administrative Code.

- Long-term Monitoring - Long-term monitoring of ground water and surface water will be conducted to monitor and ensure the effectiveness of the remedy. Monitoring results will be evaluated annually to aid in predicting contaminant trends.

- Five-Year Reviews - U.S. EPA will formally evaluate all components to determine the effectiveness of the selected remedy (e.g., cover, ground water treatment, and long-term Natural Attenuation of ground water) as part of the five-year review process (five-year reviews are required for sites where wastes are left

on-site). If the data available at the first five-year review is insufficient for a reliable trend analysis, evaluation of remedy performance will be completed in the subsequent review or at some earlier time (to be established during the initial five-year review). An evaluation of information gathered for each five-year review will be used to determine whether or not there is a need for additional actions to reduce cleanup times. These additional activities are likely to involve more data collection, additional treatment design or other technically practicable remedial measures, including evaluations of any applicable new technology. The design of additional measures (should they be necessary) may include: locating ground water extraction wells (or other remedies) to maximize hydraulic capture of the plume and additional on-site treatment, as appropriate. The ground water cleanup must be achieved within a reasonable period of time. For this type of situation, a reasonable period of time for meeting the MCLs can be defined as not significantly longer than technically practicable active treatment across the entire plume.

The soils excavation, treatment/off-site disposal, arsenic soil stabilization and vegetative cover will require approximately 1 year to complete after design approval. The interim ground water system will take approximately six years to complete after the pilot test and design approval. After the interim ground water remedy, the long-term Monitored Natural Attenuation component will be ongoing. The estimated length of time to reach MCLs in ground water under the Monitored Natural Attenuation remedy will be based on sampling completed after implementation of the interim ground water treatment system.

The estimated costs for Alternative 3 are:

Estimated Capital Cost	$14,100,000
Present Worth of O&M	$10,900,000
Present Worth	**$25,000,000**

It is estimated that an addition $1.5 million will be required to manage the creosote contaminated soils. The final estimated costs for the Proposed Alternative are:

Present Worth	$25,000,000
Creosote Soils	$ 1,500,000
FINAL PRESENT WORTH	**$26,500,000**

Based on information currently available, the U.S. EPA believes the Preferred Alternative provides the best balance of tradeoffs among the other alternatives with respect to the evaluation criteria. The U.S. EPA expects the Preferred Alternative to satisfy the statutory requirement in CERCLA section 121 (b) to: 1) be protective of human health and the environment; 2) comply with ARARs and provides the justification for waiving the Underground Injection Control Class IV prohibition for reinjection (due to the interim nature of the ground water remedy; 3) be cost-

effective; 4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and 5) satisfy the preference for treatment as principal element.

Actual or threatened future releases of hazardous substances from this Site, if not addressed by the proposed alternative, may present an unacceptable risk to human health and the environment.

IEPA Concurrence

It is anticipated that the Illinois EPA will concur with all recommendations for the proposed cleanup alternatives.

COMMUNITY PARTICIPATION

Your input on the Proposed Plan for the Site is important to U.S. EPA. Comments provided by the public are valuable in helping U.S. EPA select a final cleanup remedy.

Please submit any written comments, postmarked by March 23, 1999, to the U.S. EPA address provided. If you have any questions about the comment period, please contact Janet Pope at (312) 353-0628 or through U.S. EPA's toll-free number at 1-800-621-8431.

THE NEXT STEP

U.S. EPA will consider public comments received during the public comment period before choosing a final action for the Site. The final action will be described in the Record of Decision.

After the final action is chosen, U.S. EPA will meet with the party or parties believed responsible for the Site contamination and request that they implement the remedy and provide long-term management of the Site. Following negotiations, the final action will be designed and implemented. If the party or parties are unable to negotiate an agreement with U.S. EPA, or are unwilling to complete the required activities, Superfund monies may be used to pay for the final action. U.S. EPA may try to recover these costs in federal court.

ADDITIONAL INFORMATION

Anyone interested in learning more about the investigation, the Proposed Plan for controlling contamination at the Site, or the Superfund process is encouraged to review the information repositories maintained for the Site. These repositories contain copies of the Remedial Investigation, the Risk Assessment, Pre-Design Investigations, the Feasibility Study, the Proposed Plan, and other materials related to the Site. The local information repository is located at:

Waukegan Public Library
128 North Country

Waukegan, IL

An Administrative Record file, which contains the information upon which the selection of the cleanup plan will be based, has also been established at the above public library, and the U.S. EPA Region 5 office in Chicago.

To submit written comments or for further information on the Site, please write to the EPA address below or call:

U.S. EPA Contacts

Michael E. Bellot
Remedial Project Manager
U.S. Environmental Protection Agency
77 West Jackson, SR-6J
Chicago, Il 60604-3950
(312) 353-6425

Janet Pope
Community Involvement Coordinator
Office of Public Affairs (P-19J)
U.S. Environmental Protection Agency
77 West Jackson, SR-6J
Chicago, Il 60604-3950
(312) 353-0628
Toll Free 1-800-621-8431

Waukegan Citizens Advisory Group

Susie Scheiber
CAG Point of Contact
P.O. Box 91
Waukegan, Il 60079

Illinois EPA Contact

Gerald Willman
Project Manager
Illinois EPA
2200 Churchill Road
Springfield, Il 62794-9276
(217) 524-6365

FIGURES

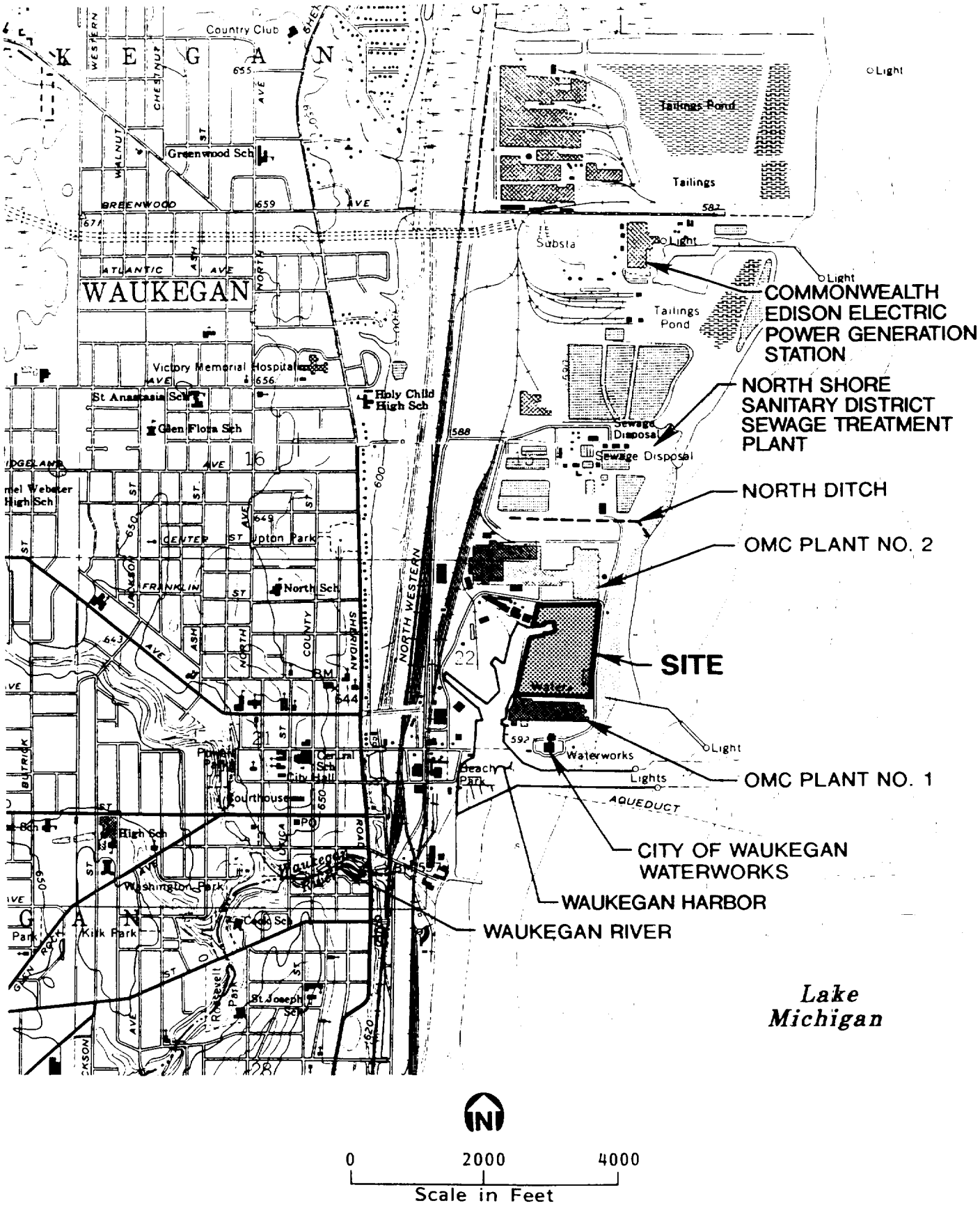
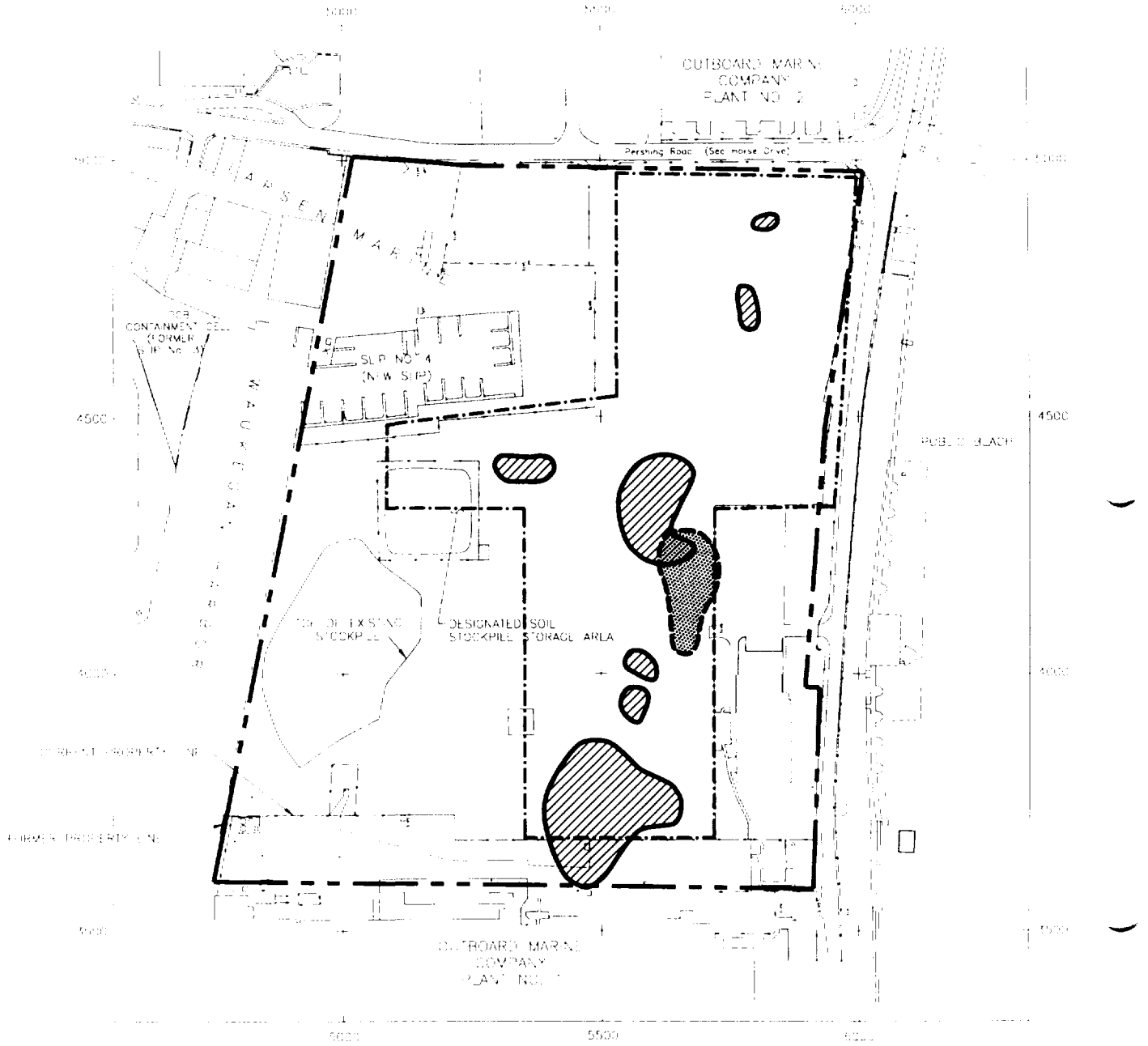


Figure 1.

SITE LOCATION MAP
Waukegan Manufactured Gas and Coke Plant



Marginal Zone Soil

PAH Remediation Zone

Arsenic Remediation Zone

NOTE:
Information Based On Test Trench Logs And Soil Boring Logs.

N

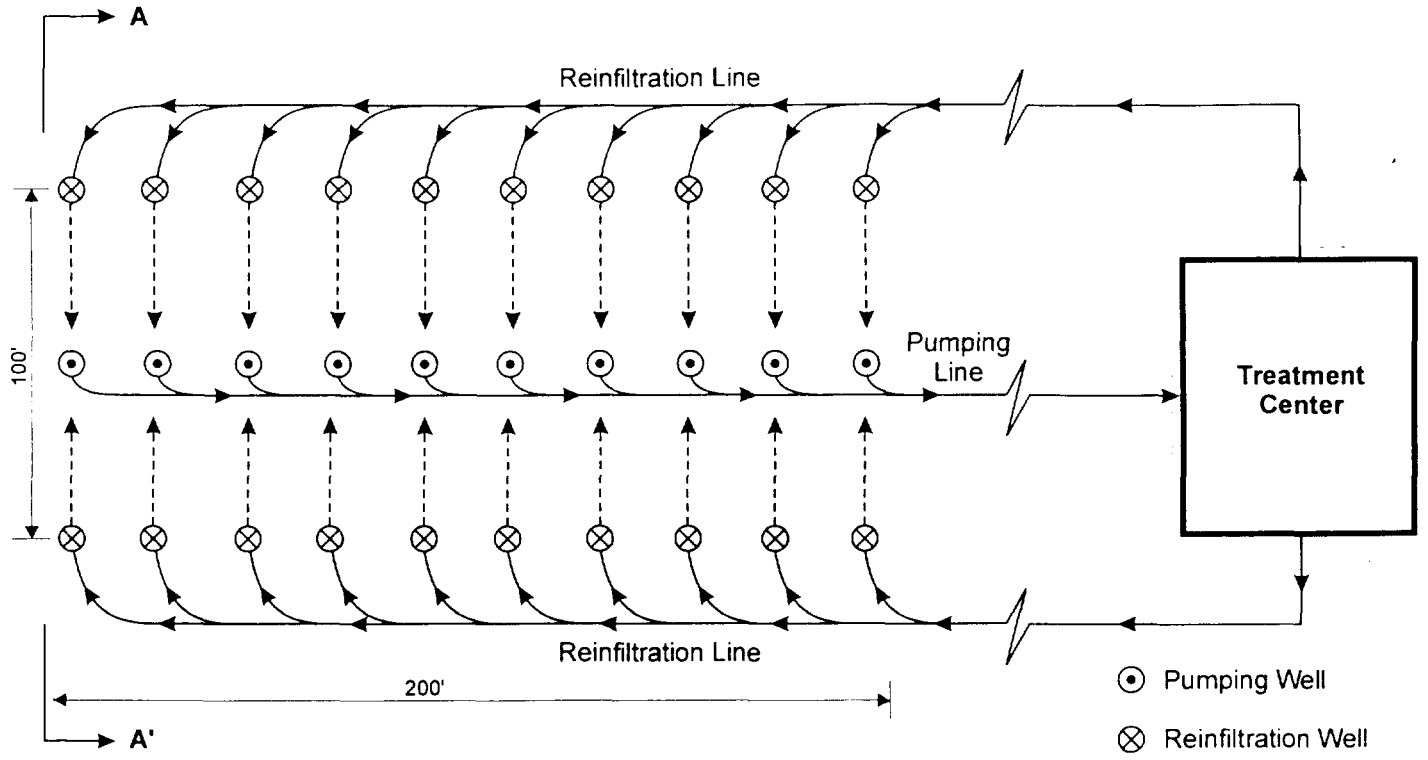
0 300

SCALE IN FEET

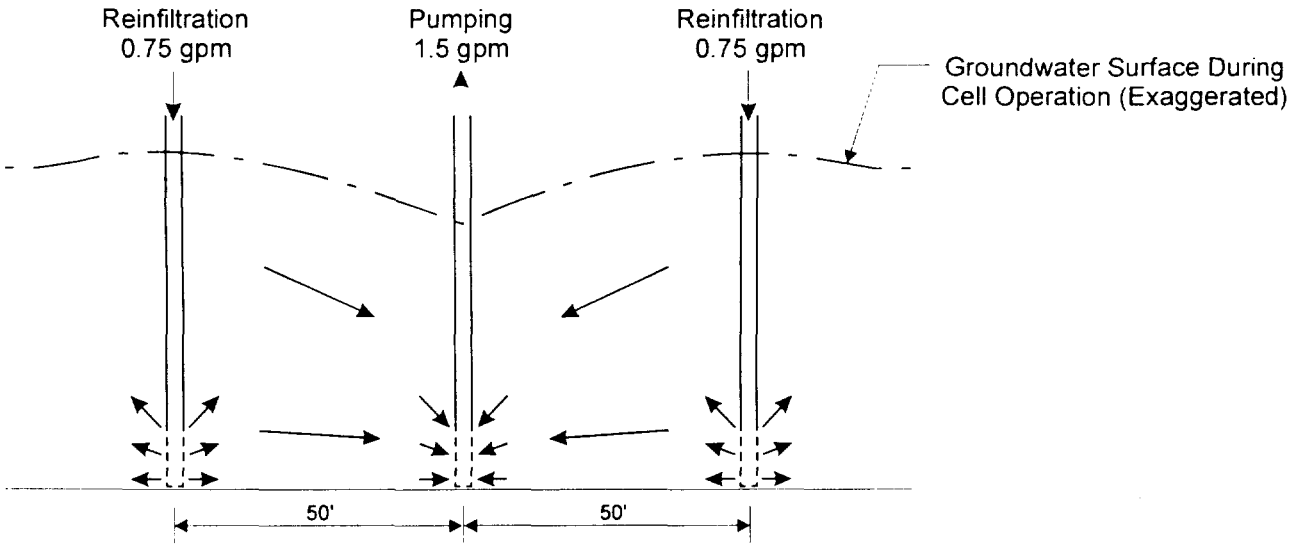
Figure 2.

ANTICIPATED AREA OF SOIL REMEDIATION

Waukegan Manufactured Gas & Coke Plant Site



PLAN VIEW OF A CELL



CROSS SECTION VIEW OF A CELL

Figure 3.

CONCEPTUAL LAYOUT FOR A TYPICAL CELL
Waukegan Manufactured Gas & Coke Plant Site

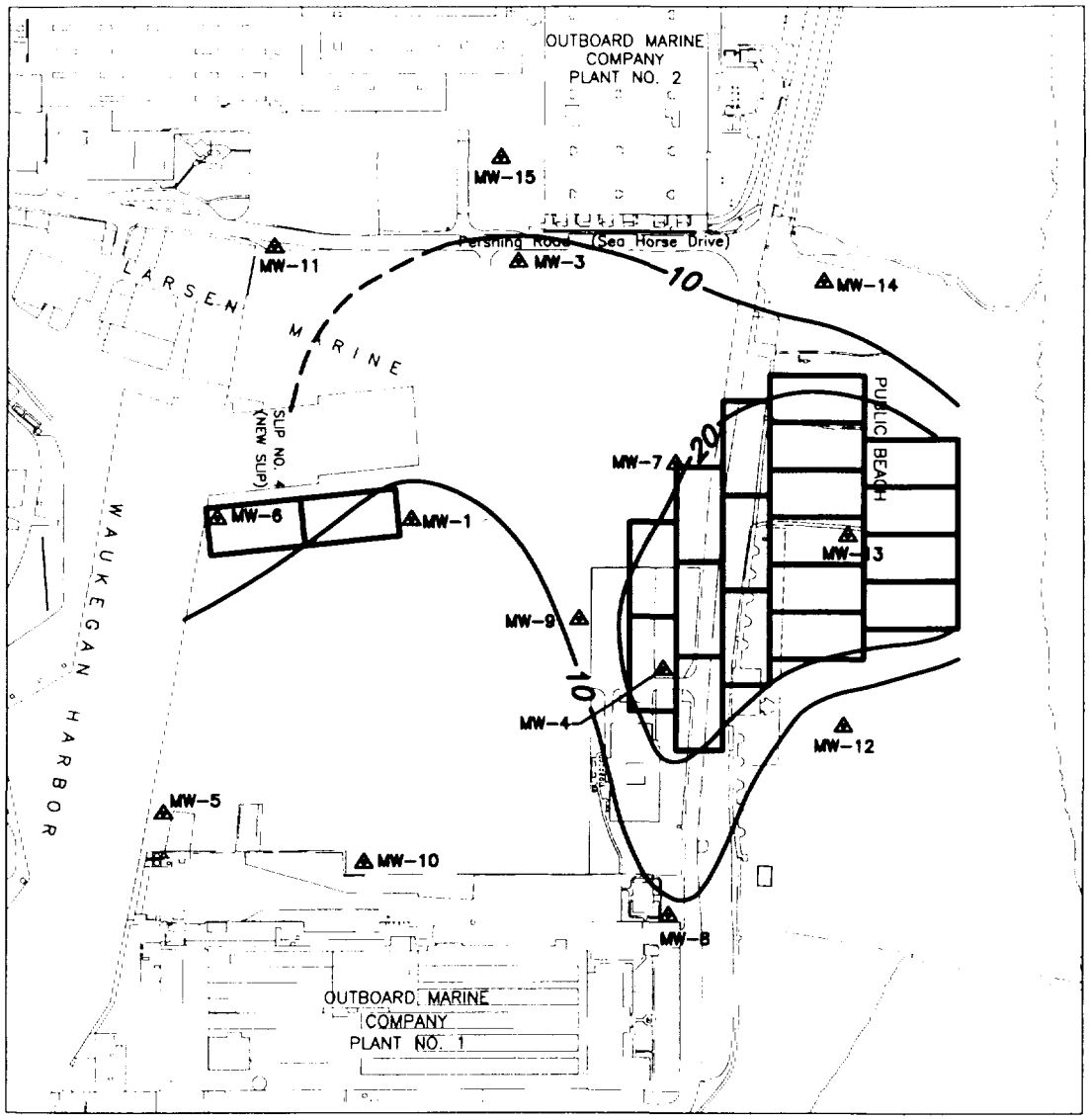


Figure 4.

TREATMENT CELL IMPLEMENTATION ZONE

Waukegan Manufactured Gas & Coke Plant Site